INDEX to Volume 73

January, 1987, pages 1-120 **February,** 121-232 **March,** 233-352
April, 353-464 **May,** 465-576 **June,** 577-688

Titles

Black Heart of Comet Halley, The, *Fred L. Whipple,* 242
British Plan for the Year 2000, *David H. Smith,* 497
Bygone Era of Time Balls, The, *Ian R. Bartky,* 32
Challenge of Space Surveillance, The, *Capt. J. Andreas Howell,* 584
Comet Halley and the Solar Wind, *Roald Z. Sagdeev* and *Albert A. Galeev,* 252
Comet Rendezvous — The Next Step, *Marcia Neugebauer,* 266
Desperately Seeking Supernovae, *Ronald N. Kahn,* 594
Education of Mary Somerville, The, *Kenneth Weitzenhoffer,* 138
From Aerobee to AXAF, *David H. Smith,* 606
Gauging Angles in the 17th Century, *Allan Chapman,* 362
Giant Galactic Arcs, *Leif J. Robinson,* 379
IHW Island Network, The, *Malcolm B. Niedner, Jr.,* and *William Liller,* 258
Images, 592
In Search of Martian Seas, *Stuart J. Goldman,* 6
Inside the IHW: The Amateurs, *Alan MacRobert,* 264
Inside the IHW: The Professionals, *J. Kelly Beatty,* 256
IRAS and the Quasars, *Richard Tresch Fienberg,* 13
Japan's Blossoming Space Science, *Minoru Oda* and *Yasuo Tanaka,* 7
Kavalur's Stellar Hermitage, *Dilip M. Salwi,* 375
Light from the Depths of Time, *Rudolf Kippenhahn,* 140
March Annular-Total Eclipse, The, *Edward M. Brooks,* 12
Monster Telescopes for the 1990's, *Leif J. Robinson,* 495
Neutrinos from Hell, *Ronald A. Schorn,* 477
New Charts for the Deep Sky, *George Lovi,* 611
New-Wave Pulsars, *Nicholas E. White,* 22
Project Galileo: The Phoenix Rises, *Michael W. Carroll,* 359
Quantized Galaxy Redshifts, *William G. Tifft* and *W. John Cocke,* 19
Realm of the Comets, *Paul R. Weissman,* 238
Sampling the Stuff of a Comet, *Roger Knacke,* 246
Satellites on a String, *Robert G. Nichols,* 383
Secrets of Galaxy Clusters, *David H. Smith,* 377
Shaping of Planetary Nebulae, The, *Bruce Balick,* 125
Sky-Gazer's Almanac 1987, 59
Splendor of Eta Carinae, The, *David Malin,* 14
Stardust on Earth, *J. Kelly Beatty,* 610
Star Formation and IRAS Galaxies, *David A. Allen,* 372
Sunspot Cycle, The: Tip of the Iceberg, *Leif J. Robinson,* 589
Supernova in Our Backyard, A, *Ronald A. Schorn,* 382
Supernova Shines On, *Ronald A. Schorn,* 470
Surprising Supernova, A, *Ronald A. Schorn,* 582
Temperate F Stars, The, *James B. Kaler,* 131
Tracing M81's Spiral Arms, *Michele Kaufman,* 135
Vanishing Solar Neutrinos, *Anna Franco* and *David H. Smith,* 149
Where Are We Going? *Timothy Ferris,* 486
White Sirian Stars: Class A, *James B. Kaler,* 491
Will Space Telescope Be Ready? *J. Kelly Beatty,* 146

Authors

Allen, David A., Star Formation and IRAS Galaxies, 372
Balick, Bruce, The Shaping of Planetary Nebulae, 125
Bartky, Ian R., The Bygone Era of Time Balls, 32
Beach, Greg, A 17½-inch "Chameleon," 554
Beatty, J. Kelly, book review, 393
Inside the IHW: The Professionals, 256
Stardust on Earth, 610
Will Space Telescope Be Ready? 146
Beekman, George, letter, 237
Bennett, Walter, Keeping the Snow Out, 327
Block, David L., letter, 237
Blome, Hans-Joachim, see *Priester, Wolfgang*
Bortle, John E., Comet Digest, 114, 226, 346, 456, 570, 682
Bova, Ben, book review, 507
Boyce, Peter B., Astronomy, *Challenger,* and Budget Cuts, 468
Brooks, Edward M., The March Annular-Total Eclipse, 12
Byrd, Deborah, The Sun, Moon, and Planets This Month, 64, 178, 294, 410, 522, 636
Campins, Humberto, and *Harold A. Weaver,* Observing Halley from 41,000 Feet, 251
Carroll, Michael W., Project Galileo: The Phoenix Rises, 359
Chapman, Allan, Gauging Angles in the 17th Century, 362
Clark, Tom, Building Lightweight Telescopes for Two, 323
Cocke, W. John, see *Tifft, William G.*
Corder, Jeffrey, M101, The Ursa Major Spiral, 676
Cruikshank, Dale P., Cometary Studies Come of Age, 236
de Vaucouleurs, Gerard, letter, 469
DeYoung, James A., and *James L. Hilton,* letter, 357
di Cicco, Dennis, Dean of the Deep Sky Turns 75, 566
Dryer, Ivan, letter, 605
Dunham, David W., Lunar Occultation Highlights for 1987, 68
March 5th Pleiades Occultation, The, 296
Planetary Occultations of Stars in 1987, 70
Dyck, Gerald, Finding Variable Stars by Fishhooks, Lampshades, and Candlesticks, 658
Everhart, Edgar, Tracking Comets with a Stepping Motor, 208
Tracking Down a Comet, 196
Farquhar, Robert W., Playing Cometary Tag, 267
Ferris, Timothy, Where Are We Going? 486
Fienberg, Richard Tresch, IRAS and the Quasars, 13
Franco, Anna, and *David H. Smith,* Vanishing Solar Neutrinos, 149
Frydman, David H., letter, 237
Galeev, Albert A., see *Sagdeev, Roald Z.*
Garmire, Gordon P., book review, 41
Gebelein, Rolin, Notes on Movable Primary Mirrors, 555
Giammanco, Jim, letter, 124
Gingerich, Owen, book review, 281
letter, 4
Goldman, Stuart J., In Search of Martian Seas, 6
Gordon, Barry, The E-M Method of Polar Alignment, 454
Gordy, Leland, letter, 358
Greenberg, J. Mayo, letter, 605
Gregory, John, A Quest for the Perfect Refractor, 662
Harrington, Phil, book review, 281
Heslop, A. C., A Way To Make Big Focusers, 95
Hilton, James L., see *DeYoung, James A.*
Hines, Jeffrey A., Long Island Amateur's Reflector, 551
Hoell, Josef, see *Priester, Wolfgang*
Houston, Walter Scott, Deep-Sky Wonders, 115, 227, 347, 458, 571, 683
Howell, Capt. J. Andreas, The Challenge of Space Surveillance, 584
Hughes, David W., book review, 618
Hysom, E. J., book review, 619
Iburg, Bill, Adventures in Gas Hypering, 110 (correction, 228)
Islam, Jamal Nazrul, book review, 156
Jolly, Wanda, In Defense of the Sun, 356
Kahn, Ronald N., Deperately Seeking Supernovae, 594
Kaler, James B., The Temperate F Stars, 131
White Sirian Stars: Class A, 491
Kaufman, Michele, Tracing M81's Spiral Arms, 135
Kellermann, Kenneth I., book review, 500
Kelso, T. S., Astronomical Software Benchmarks, 309
Kemp, James C., book review, 45
Kennewell, John A., The Flight of a Meteor, 83 (correction, 197)
Kessler, Donald J., Space Debris: More Than Meets the Eye, 587
Kippenhahn, R., Light from the Depths of Time, 140
Knacke, Roger, Sampling the Stuff of a Comet, 246
Krupp, E. C., book review, 157
Landgraf, Werner, More on Kepler's Equation, 535
Levy, David, Clyde Tombaugh: Planetary Observer and Telescope Maker, 88
The Discovery of Comet Levy, 1987a, 546
Logsdon, John M., NASA and Halley: The Road Not Taken, 268
Lovi, George, book review, 391
New Charts for the Deep Sky, 611
Rambling Through the Skies, 57, 175, 291, 407, 519, 629
MacRobert, Alan, book review, 503
Caring for Optics, 380
Inside the IHW: The Amateurs, 264
Star Finding with a Planisphere, 143
Malin, David, letter, 358
The Splendor of Eta Carinae, 14
Martinez, Tom J., Powell Observatory's 30-inch reflector, 545
Mattox, John, and *Ronald Vervack,* Hypering? Cooling? How About Both? 112
Meeus, Jean, letter, 357
Moore, Patrick, letter, 581
Morgan, John A., book review, 390
Morrison, David, Is the U. S. Abandoning the Solar System? 580
Mosley, John, Review Corner, 85, 310, 537
Moyer, Gordon, letter, 4
Neugebauer, Marcia, Comet Rendezvous — The Next Step, 266
Nichols, Robert G., Satellites on a String, 383
Nicholson, Donald S., letter, 581
Niedner, Malcolm B., Jr., and *William Liller,* The IHW Island Network, 258
Oda, Minoru, and *Yasuo Tanaka,* Japan's Blossoming Space Science, 7
O'Meara, Stephen James, Beautiful Occultation of Venus, A, 412
Japanese Data Center in Australia, 202
Philippines, The: A Land in Shadow, 132
Project Milky Way, 656
Spotlight on Japan, 200
Straight Lunar Wall, The, 639
Owen, Tobias, book review, 158
Paul, E. Robert, book review, 40
Phillips, James H., M.D., letter, 357
Priester, Wolfgang, Hans-Joachim Blome, and *Josef Hoell,* letter, 237
Puhakka, Timo, letter, 476
Redburn, Fred L., A Digital Foucault Tester, 439
Ridley, Harold B., letter, 124
Robinson, Jack H., letter, 124
Robinson, Leif J., Giant Galactic Arcs, 379
Monster Telescopes for the 1990's, 495
Our Celebration of Halley, 238
Sunspot Cycle, The: Tip of the Iceberg, 589

Romero, Joseph, letter, 476
R.W.S., see *Sinnott, Roger W.*
Sagdeev, Roald Z., and *Albert A. Galeev,* Comet Halley and the Solar Wind, 252
Salanave, Leon E., letter, 5
Salwi, Dilip M., Kavalur's Stellar Hermitage, 375
Sanderson, Richard H., letter, 581
Sanford, John, A New California Observatory, 546
Sato, T., Japan's Largest Public Observatory, 201
Schaefer, Bradley E., Extinction Angles and Megaliths, 426
Schneider, G., October's Remarkable "Totality," 222
Schneider, Stephen E., letter, 469
Schorn, Ronald A., book review, 389
Neutrinos from Hell, 477
Supernova in Our Backyard, A, 382
Supernova Shines On, 470
Surprising Supernova, A, 582
Schutz, Bernard, book review, 501
Sinnott, Roger W., Adding the Moon to a Real-Time Clock, 536
Crosshairs from Spider Web, 97
Resolution Results, 443
S.J.O., see *O'Meara, Stephen James*
Smith, Bill R., letter, 358
Smith, David H., British Plan for the Year 2000, 497
From Aerobee to AXAF, 606
Secrets of Galaxy Clusters, 377
see also *Franco, Anna*
Smith, Ron Paul, letter, 237
Sorensen, Brent, A Simple Slit Spectrograph, 98
Steffey, Philip C., letter, 5
Tanaka, Yasuo, see *Oda, Minoru*
Terzian, Yervant, Radio Images and Planetaries' Distances, 128
Tifft, William G., and *W. John Cocke,* Quantized Galaxy Redshifts, 19
Trueblood, Mark, letter, 581
Vervack, Ronald, see *Mattox, John*
Vorontsov-Velyaminov, B. A., letter, 4
Walch, Michel, letter, 124
Weaver, Harold A., see *Campins, Humberto*
Weissman, Paul R., book review, 39
Realm of the Comets, 238
Weitzenhoffer, Kenneth, The Education of Mary Somerville, 138
Whipple, Fred L., The Black Heart of Comet Halley, 242
White, David, letter, 358
White, Nicholas E., New-Wave Pulsars, 22
Wood, John A., book review, 279
Zuckerman, B., Molecular Hydrogen Envelopes, 129

Departments and Features

Amateur Astronomers —
Calendar of Events, 548
Clyde Tombaugh: Planetary Observer and Telescope Maker, 88
Clyde Tombaugh Scholars Program, The, 89
Discovery of Comet Levy, 1987a, The, 546
Finding Variable Stars by Fishhooks, Lampshades, and Candlesticks, 658
In Search of Historic Observatories, 315
International News, 90, 317, 434 (correction, 659), 547
Japanese Data Center in Australia, 202
Japan's Largest Public Observatory, 201
New California Observatory, A, 546
Philippines, The: A Land in Shadow, 432
Powell Observatory's 30-inch Reflector, 545
Project Milky Way, 656
Spotlight on Japan, 200
Two New Major Observatories, 545
U. S. News, 203, 659
Astronomical Computing —
Adding the Moon to a Real-Time Clock, 536
Astronomical Software Benchmarks, 309
Bits and Bytes, 427, 647
Extinction Angles and Megaliths, 426
Flight of a Meteor, The, 83 (correction, 197)
More on Kepler's Equation, 535
Review Corner, 85, 310, 537
Savage Benchmark Revisited, The, 646
Software Magazine, 537
Tracking Down a Comet, 198
Backyard Astronomy —
Caring for Optics, 380
Star Finding with a Planisphere, 143
Books and the Sky —
Advanced Telescope Making Techniques, Vol 1: Optics; Vol. 2: Mechanical, Allan Mackintosh, editor, with G. Kenneth Hawkins and Ferdinand I. Baar, 619
Amateur Astronomer's Catalog of 500 Deep-Sky Objects, Vol. 1, Ronald J. Morales, 281
Anthropic Cosmological Principle, The, John D. Barrow and Frank J. Tipler, 156
Big and Bright: A History of the McDonald Observatory, David S. Evans and J. Derral Mulholland, 389
Cosmic Debris: Meteorites in History, John G. Burke, 618
Cosmic Impact, John K. Davies, 393
Einstein's Dream, Barry Parker, 390
Exploring the Night Sky with Binoculars, Patrick Moore, 503
Extraterrestrial Life Debate 1750-1900, The, Michael J. Crowe, 40
Invisible Universe Revealed, The, Gerrit L. Verschuur, 500
Nemesis Affair, The, David M. Raup, 39
Nicholas Copernicus, Vol. 3: Minor Works, Pawel Czartoryski, editor, 281
Physics Through the 1990s: Gravitation, Cosmology, and Cosmic Ray Physics, Physics Survey Committee, National Research Council, 41
Quest for SS433, The, David H. Clark, 45
Reaching for the High Frontier, Michael A. G. Michaud, 507
Short Guide to Modern Star Names and Their Derivations, Paul Kunitzsch and Tim Smart, 157
Star Gazing Through Binoculars, Stephen Mensing, 503
Synopsis of the Nomenclature of the Fixed Stars, Helmut Werner and Felix Schmeidler, 391
Thunderstones and Shooting Stars, Robert T. Dodd, 279
To Utopia and Back: The Search for Life in the Solar System, Norman H. Horowitz, 158
Was Einstein Right? Clifford M. Will, 501
Briefly Noted, 46, 159, 282, 393, 508, 624
Celestial Calendar —
Asteroid Astraea, The, 180
Astraea Crosses the Beehive, 297
Beautiful Occultation of Venus, A, 412
Calendar Notes, 73, 185, 297, 414, 526, 642
Ceres Sails by the Lagoon, 639
Great Supernova of 1987, The, 524
Halley Bowing Out, 66
Jupiter's Satellites, 64, 178, 294, 522, 636
Lunar Occultation Highlights for 1987, 68
Lunar Straight Wall, The, 639
Many Moons of Saturn, The, 638
March 5th Pleiades Occultation, The, 296
Mira Nears Maximum, 72
Moon Covers Spica, The, 183
Moon Phases and Distances, 65, 179, 295, 411, 523, 637
1987 Planet Preview, A, 66
Nova Andromedae 1986, 181
Observing from the City, 415
Pallas This Spring and Summer, 526
Planetary Occultations of Stars in 1987, 70
Shallow Eclipse, A, 414
Sun, Moon, and Planets This Month, The, 64, 178, 294, 410, 522, 636
T Pyxidis Outburst Due, 180
Voyager 2 Sails Across the Trifid, 639
Watching Pluto Blink, 413
50 and 25 Years Ago, 5, 130, 255, 371, 476, 597
Focal Point —
Astronomy, *Challenger,* and Budget Cuts, 468
Cometary Studies Come of Age, 236
In Defense of the Sun, 356
Is the U. S. Abandoning the Solar System? 580
Front-cover photographs —
Eta Carinae Close-up, 1
Galileo Swings Past Earth, 353
Halley's Elusive Nucleus, 233
Roman Eclipse, 121
Supernova! 465
Supernova Sleuths, 577
Gleanings for ATM's —
Building Lightweight Telescopes for Two, 323
Couple of Hefty Scopes, A, 551
Crosshairs from Spider Web, 97
Digital Foucault Tester, A, 439
Keeping the Snow Out, 327
Long Island Amateur's Reflector, 551
Notes on Movable Primary Mirrors, 555
Quest for the Perfect Refractor, A, 662
Resolution Results, 443
17½-inch "Chameleon," A, 554
Simple Slit Spectrograph, A, 98
Tracking Comets with a Stepping Motor, 208
Way To Make Big Focusers, A, 95
Letters, 4, 124, 237, 357, 469, 581
News Notes —
"Active Nucleus" at a Galaxy's Edge? 603
Alien Comets: No Threat to Earth, 154
And Then There Were Three . . . , 366
Astrocentre in Toronto, 369
Astronomers Honored, 480
Astronomy from Mir, 598
Balloon Flights View Sun and Gather Cosmic Rays, 481
Bright Infrared Galaxies, 29
CCD Images of Supernova Remnants, 27
China's Sakharov, 371
Chrétien Award, 150
Circinus X-1's Giant Radio Nebula, 368
Circumstellar Disk Update, 274
Convection Theory Vindicated, 603
Double Beta Decay Observed? 602
Doublespeak Award, 368
Electroglow Explained, 274
Escape from Mars, 155
Exciting Solar Oscillations, 276
Extending VLBI into Space, 370
Families of Giant Stars, 25
FU Orionis and Its Ilk, 272
Galaxy in the Making? 365
Giacobini-Zinner's Magnetic Tail, 480
Gravitationally Lensed Giant Galaxy, 482
Graying of Astronomy, 26
Greenland's Cosmic Dust Deposits, 367
Hawaii's Radio Eyes, 152
Help for Teaching Astronomy, 369
Herbig-Haro Object Unmasked, A, 30
Herstmonceux To Close, 150
HST Proposal Deadline Extended for Amateurs, 150
Hubble Trouble? 31
Infrared Cirrus, 601
IRAS Asteroid Catalogue, 599
Julius Staal (1917-86), 26
Keeping Up with Cygnus X-3, 272
Lithium Casts Doubt on Galactic History, 28
Making a Better Star Show, 366
Mars Explorer, 31
Mexican Telescope Sees First Light, 367
Milky Way's Fountain, The, 485
Missing Mass: What It's Not, 150
Most Distant "Normal" Galaxy, The, 365
New Distance to the Hyades, 28
New Herschel Memorial, 604
New Paris Planetarium and Omnimax Theater, 152
Newton Vindicated — Einstein, Too! 484
New X-Ray Satellite, 365
Oceans under the Crust of Europa, 602
Oort Cloud or Bust, 151
Perseus Flasher, The: Mystery Solved! 604
Pluto-Charon Update, December, 1986; correction to, 155
Quasar Cluster Discovered, 483
Quasar with Rotating "Fuzz," A, 599
Radio Lobes Revealed, 25
R Cor Bor's Cold Nebula, 369
Real Orion, The, 482
Recent Volcanism on Mars? 602
Shadow Bands Explained, 27
SN 1006's Radio Portrait, 480
Solar Gold, 26
Solar Records Set in Stone, 153
Speckled Vesta, 598
Stellar Mass-Loss Theory Spells Trouble, 154
Stellar Quick-Change Artist, A, 30
Sunspot Futures, November, 1986; correction to, 602
Super Collider Approved, 604
Supernova in the Large Magellanic Cloud, 370
Tales from Io — I: A Volcano Shuts Down, 485; II: An Atmosphere Outsmarted, 485
Tektites and Lunar Volcanoes, 481
True Nature of Stormy XY Leonis, The, 600
Truly Extraterrestrial UFO, A, 603

Ultimate Space Debris, 155
Ultrafast Binary Star, 154
Uranus' Methane Cloud, 273
Voyager 2 Takes Aim at Neptune, 601
Were Titius and Bode Right? 371
What Color Is Venus? 150
Yu-Che Chang, 481
Zeiss Shoots for the Moon, 604
Observer's Page —
Adventures in Gas Hypering, 110 (correction, 228)
Comet Digest 114, 226, 346, 456, 570, 682
Comet Sorrells, 1986n, 114
Dean of the Deep Sky Turns 75, 566
Deep-Sky Wonders 115, 227, 347, 458, 571, 683
E-M Method of Polar Alignment, The, 454
High-Resolution Views of Mars and Jupiter, 680
Hypering? Cooling? How About Both? 112
Mars and Jupiter Pair Together, 455
M101, The Ursa Major Spiral, 678
November 13th Transit of Mercury, The, 223
Observers' Notebook, 457
October's Remarkable "Totality," 222
October's Solar Eclipse, 113
October's Total Lunar Eclipse, 224
Sky Photography near the Arctic Circle, 343
Sunspot Numbers, 116, 229, 349, 460, 573, 685
Rambling Through the Skies —
High-Low Moon of 1987, The, 57
Magellanic "Toolhouses of Great Merit," 629
North View, A, 175
Star Names and Other Updates, 407
Teaching Space Science, 291
That Amazing Analemma, 519
Southern Stars for . . . (current months), 56, 290, 518
Stars for . . .(current month), 58, 176, 292, 408, 520, 630

Selected Topics and Celestial Objects

This listing is not intended to be exhaustive and does not supplant the other parts of the index. For example, material in such regular features as Books and the Sky is ordinarily indexed only under the Departments and Features section.

Amateur astronomy: asteroid names, 318; Australian Milky Way panorama project, 656; changing streetlights in Australia, 547; charts for the deep sky, 611; Comet Halley time capsule, 547; Dyck's microconstellations, 658; European Halley seminar, 434, 659; International Halley Watch, 264; Japanese, 200; new Californian society, 547; observing cloak, 547; Philippine, 432; public observing at McDonald Observatory, 317; satellite users' group, 90; small-telescope club, 547

Archaeoastronomy: 124

Art: Carroll's Galileo mission, 353, 359, 361; Davis' Orientale basin, 393; galaxy quilt, 434; watercolors of historic observatories, 315

Asteroids: IRAS catalogue of, 599; named for amateur astronomers, 318; naming of 694 Ekard, 581; three lost bodies recovered, 366; Vesta imaged, 598

Atmospheric phenomena: "Chinese lantern" effect at sunset, 343; iridescent clouds, 343; noctilucent clouds, 345; refraction of Sun and Moon, 344; refraction of Venus, 343; supersonic shock waves and image of Jupiter, 457

Awards: Bruno Rossi Prize, 480; Chrétien, 150; Doublespeak, 368; Wolf Prize, 480

Clusters: distance to Hyades, 28, 469. Globular — M4, 684; M13, 684; NGC 5139, 571

Comet Halley: 226, 346; composition and structure of nucleus, 242; dust analysis, 246, 610; International Halley Watch, 256, 258, 264; Japanese data center in Australia, 202; Japanese publications on, 317; KAO and, 251; NASA and, 268; Palitzsch and, 4, 476; Panamanian stamp of, 434; solar wind and, 252; time capsule in Kansas, 547

Comets (see also Comet Halley): alien, as threat to Earth, 154; CRAF mission to, 266; Giacobini-Zinner's magnetic tail, 480; headless, of 1887, 114; Oort cloud of, 238; studies come of age, 236; tracking, with stepping motor, 208; Levy, 1987a, 346, 456, 546; Nishikawa-Takamizawa-Tago, 1987c, 456, 570; Sorrells, 1986n, 114, 226, 346, 570, 682; Terasako, 1987d, 456; West, 1975n, 253; Wilson, 1986l, 226, 346, 456, 570, 682; P/Borrelly, 682; P/Grigg-Skjellerup, 1986m, 570, 682; P/Klemola, 1987i, 682; P/Wiseman-Skiff, 1987b, 456

Computers: astronomical software benchmarks, 309, 646; calculating Kepler's equation, 535; extinction angles and megaliths, 426; lunar clock, 536; simulating a meteor's flight, 83; tracking down a comet, 196

Constellations and asterisms: celestial cartography, 175; finding, with a planisphere, 143; Jamieson's *Celestial Atlas*, 175; navigation stars, 358; proper names of, 407

Cosmology: cosmic rays detected from NASA balloon, 481; double beta decay observed? 602; Einstein's theory of relativity vindicated, 484; gravitational lensing of 3C 324, 482; missing mass, 150; new millisecond pulsars, 22; Olber's paradox, 140; quantized galaxy redshifts, 19, 469; solar neutrinos, 149; Superconducting Super Collider, 604

Earth: collisions with alien comets, 154; motion through space, 486

Eclipses: October 3, 1986, solar, 113, 222; October 17, 1986, total lunar, 224; March 29, 1987, annular-total solar, 12; March, 1988, Philippine total solar, 432; shadow bands and, 27; unusual observation of Cosmos satellites during, 457

Education: Clyde Tombaugh Scholars Program, 89; teaching space science, 291

Galaxies: "active nucleus" at edge of, 603; bright infrared, 29; clusters of, 377; giant galactic arcs, 379; gravitational lensing of 3C 324, 482; hot gas fountaining from Milky Way's "corona," 485; in the making, 365; lithium and galactic evolution, 28; Magellanic Clouds, 639; M101 as an amateur target, 678; most distant "normal," 365; motion of Milky Way through space, 486; quantized redshifts of, 19, 469; size of M81, 237; Small Magellanic Cloud, 131; spiral arms of M81, 135; star formation in IRAS, 372; M81, 572; NGC 253, 111; NGC 2859, 348; NGC 2903, 459; NGC 2964, 459; NGC 2968, 459; NGC 3130, 459; NGC 3162, 459; NGC 3177, 459; NGC 3184, 348; NGC 3190, 459; NGC 3245, 348; NGC 3277, 348; NGC 3294, 348; NGC 3344, 348; NGC 3395, 348; NGC 3430, 348; NGC 3992, 572; NGC 4038, 572; NGC 5128, 572; NGC 6207, 684

History: education of Mary Somerville, 138; gauging angles in 17th century, 362; Leverrier and the 1737 occultation of Mercury by Venus, 124; Newton's laws of motion vindicated, 484; Palitzsch and Halley's comet, 4, 476; Star of Bethlehem, 357; time balls, 32; Titius-Bode law, 371; Trumpler and light absorption in Milky Way, 4

Jupiter: fainter than Mars, 5; high-resolution photographs of Mars and, 680; in conjunction with Mars, 455; oceans under Europa's crust, 602; sodium atmosphere of Io, 485; Tombaugh's sketches of, 89; volcano shuts down on Io, 485

Light pollution: 407

Mars: ancient seas on, 6; automated rover for, 31; brighter than Jupiter, 5; high-resolution photographs of Jupiter and, 680; in conjunction with Jupiter, 455; meteorites from, 155; photographing canals on, 610; possible recent volcanism on, 602; Viking orbiter mosaic of, 592

Mercury: November, 1986, transit across Sun, 223

Meteorites: cosmic dust deposits, 367; from Mars, 155; Gobi, in China, 279; interstellar diamonds in, 605

Meteors: November, 1985, mystery shower, 124

Milky Way: hot gas fountains from "corona" of, 485; light absorption in, 4; motion through space, 486

Moon: dome project, 357; orbit of, 57; Straight Wall, 639; tektites and volcanoes on, 481

NASA: and Comet Halley, 268; balloon looks at Sun, cosmic rays, 481

Nebulae: cold, around R Coronae Borealis, 369; HH 34 and associated star, 30; infrared cirrus, 601; splendor of Eta Carinae, 14. Diffuse — Barnard's Loop, 115; Cocoon, 112; Orion, 115; M78, 116; NGC 2170, 228; NGC 2183, 228; NGC 2244, 228; NGC 2261, 228; NGC 2264, 228. Planetary — shaping of, 125; M1, 111; M27, 111; M57, 112; NGC 4361, 572

Neptune: Voyager 2 and, 601

Novae: Andromedae 1986, 181

Observatories: Astrophysical Observatory of Cananea, Mexico, 367; Caltech Submillimeter on Mauna Kea, 152; Herstmonceux closing, 150, 581; Kavalur, India, 375; watercolors of historic, 315

Observatories, amateur and public: Anza, California, 546; Douglas C. Coleman Memorial, 317; Nichihara, Japan, 201; Powell, Missouri, 545; Wafra, Kuwait, 90; watercolors of historic, 315

Personal notes: Chang, Y.-C., 481; Coleman, D., 318; Fang, L. Z., 371; Houston, W. S., 566; Hurless, C. J., 659; Korkosz, F., 581; Koyama, H., 200; Michaud, P., 659; Rohe, Rev. D. L., 91; Somerville, M., 138; Staal, J., 26; Tombaugh, C., 88

Photography: gas hypering, 110; near the arctic circle, 343

Planetariums: Astrocentre in Toronto, 369; Finnish portable, 90; Paris, new, 152

Quasars: and IRAS, 13; cluster discovered, 483; with rotating "fuzz," 599

Radio astronomy: Circinus X-1 giant nebula, 368; Cygnus X-3, 272; in Hawaii, 152; lobes of Pictor A, 25; portrait of SN 1006, 480; source 3C 326.1, 365; VLBI, 370

Saturn: occultation of 28 Sagittarii, 357

Space and spacecraft: Aerobee to AXAF, 606; budget cuts, 468; CRAF mission, 266; debris, 587; eclipse observations of Cosmos satellites, 457; Eiffel Tower centennial ring, 155; Galileo project, 359; Ginga X-ray satellite, 365; Hubble Space Telescope, 31, 146; IRAS and galaxies, 29; IRAS and Orion, 482; IRAS and quasars, 13; Japan's space-science program, 7; Kvant observatory module, 598; Mars explorer, 31; NASA and Comet Halley, 268; NASA balloon views Sun and detects cosmic rays, 481; NORAD, 237, 584; TAU project, 151; teaching science, 291; tethered satellites, 383; U. S. abandoning programs? 580; U. S. Space Command surveillance network, 584; Viking orbiter mosaic of Mars, 592; Voyager 2 and Neptune, 601

Stars: Beta Pictoris, 240, 274; color of, 358; convection theory for, 603; families of giant, 25; formation in IRAS galaxies, 372; γ Leonis, 683; mass-loss theory for, 154; Mizar, 683; Perseus Flasher identified, 604; Polaris, 683; pulsars, 22; type *A*, 491; type *F*, 131; ultrafast binary, 154

Sun: analemma, 519; balloon views X-ray, 481; gold in, 26; in defense of the, 356; Koyama's observations of, 200; November, 1986, Mercury transit across, 223; oscillations of, 276; sunspot activity recorded in stone, 153; sunspot cycle, 589

Supernovae: automatic supernova search, 594; neutrinos and, 477; 1987A in Large Magellanic Cloud, 370, 382, 470, 477, 582

Supernova remnants: CCD images of, 27; SN 1006's radio portrait, 480

Telescopes and telescope making: big focusers, 95; building lightweight, 323; cleaning optics, 380; digital Foucault tester, 439; mailbox, 90; monsters of the 1990's, 495; movable primary mirrors, 555; pinhole mirror, 124; polar aligning an equatorial telescope, 454; quest for perfect refractor, 662; radioactive lenses, 237; results from resolution test, 443; site testing at Junipero Serra Peak, 5; slit spectrograph, 98; snow-resistant dome, 327; spider-web crosshairs, 97; stepping motor for tracking comets, 208; Hines 12½-inch reflector, 551; Dall-Kirkham 15½-inch reflector, 358; Beach's 17½-inch reflector, 554; Zeiss 29½-inch Laser scope, 604; Astrophysical Observatory of Cananea 85-inch reflector, 367; Vainu Bappu 2.3-meter reflector, 376; British 5.2-meter Mersenne-Schmidt, 497; James Clerk Maxwell 15-meter radio, 153

Time: Australian signals cease, 317; lunar clock, 536; time balls, 32

UFO's: Jupiter and JAL flight 1628, 603

Uranus: electroglow explained, 274; methane cloud of, 273

Variable stars: chromospheric activity of XY Leonis, 600; cold nebula surrounding R Coronae Borealis, 369; FU Orionis, 272; using microconstellations to find, 658; Variable A in M33, 30

Venus: color of, 150